

ROBERT H. RUGGERI
ATTORNEY AND COUNSEL

P.O. Box 310

MOAB, UTAH 84532

125 NORTH MAIN

November 10, 1983

ROBERT H. RUGGERI

TELEPHONE: 259-5611

Department of Oil, Gas & Mining
4241 State Office Building
Salt Lake City, Utah 84114

Attention: Thomas N. Tetting

DIVISION OF
RE: Red Rock Mine Plan Review
Tentative Conditional Approval
S & S Mining Company
ACT/037/050
San Juan County, Utah

Dear Mr. Tetting:

Reference is made to your letter of October 14, 1983, addressed to me, relative to the above entitled matter.

1. We do commit to making these specific analysis prior to reclamation: ph; soil texture; electrical conductivity; sodium absorbtion ratio; nitrogen; phosphorus; potassium; sodium; calcium; manganese.

2. (a) With reference to the Terra Tek lab analyses, we have not received the electrical conductivity analysis from Terra Tek.

(b) Steven McNeal has received the results from these tests, but they have not been forwarded to us. We do not have a copy of the tests at this time. I understood you to tell me that you had received a copy. In any event we have again requested Terra Tek to send the results directly to you and to us. As soon as we receive it will check with you and if you have not received it by then we will forward it to you.

3. Following is Mr. Robin Groff's calculation for pond size and capacity:

Pump capacity = 40 gpm

Ave. 90 min. pumping time per day

40 X 90 = 3600 gallon per day

3600 gallon x 365 days = 1,314,000 gallon per year

Evaporation rate for Southeast Utah = 56" per year

Pond size: 180' X 220' = 39,600 square feet surface area = .71 acre

184,800 feet³ evaporated per year from pond

1,382,304 gallon evaporated per year

With the capacity of the two lower ponds used as overflow relief, we believe the size of the pond is adequate to control and contain the waste water from the mine.

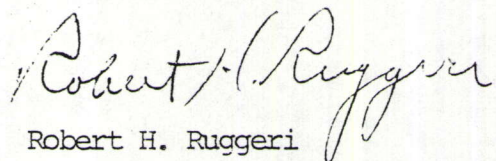
4. We propose to eliminate the impoundment facility at the south end of the waste rock pile and commit to reclamation of this pond as soon as it has dried completely. The two u-per ponds will be left in place, but there use will be discontinued for primary flow and will only be used as an over-flow for the proposed pond. We are attaching a map showing sediment control measures to be implemented on the disturbed acreage.

5. (a) In the original mine plan we proposed to clean up and ship to Atlas Minerals' mill all sediment deposited on the bottom of the ponds. We believe this is sufficient to eliminate waste material whether it is hazardous or not. In any event, after reviewing the matter, if you still are of the opinion that an analysis of the sediment must be completed this year, please advise us in writing and we will certainly comply with your instructions in this regard.

(b) It is our intention to ship to the Atlas mill all sediment deposited in all ponds, but here again if the granting of the permit is conditioned upon the assurance that an analysis will be made prior to final reclamation, I am authorized to assure you that this will be done.

I trust the above information will be sufficient for approval of the permit for the Red Rock Mine.

Sincerely,

A handwritten signature in cursive script, reading "Robert H. Ruggeri". The signature is written in dark ink and is positioned above the printed name.

Robert H. Ruggeri

RHR:JJ

Encls.

cc: Steve McNeal

October 5, 1983

Mr. Thomas N. Tetting
Utah State Natural Resources & Energy
4241 State Office Building
Salt Lake City, Utah 84114

Dear Mr. Tetting:

Six soil samples were submitted for determination of pH and sodium adsorption ratio (SAR) from the Red Rock Mine in San Juan County, Utah. Large agglomerations of soil were disaggregated and all samples were sieved using a 2 mm screen (U.S. Mesh No. 10). Saturation paste extracts were then formed using approximately 2 parts soil to 1 part deionized water. The mass of soil in each extract was approximately 100 grams. The saturated soils were allowed to stand for one hour. The pH of each slurry was then obtained using an Orion Model 701A pH meter. The slurries were allowed to stand overnight. Filtrate was recovered from each extract by vacuum membrane filtration (0.45 micron membrane) and the concentrations of sodium, calcium and magnesium were obtained by atomic adsorption spectrometry.

The SAR was calculated after the method of Richards (1954). SAR is defined as follows:

$$SAR = \frac{Na^+}{\sqrt{\frac{Ca^{2+} + Mg^{2+}}{2}}}$$

where Na, Ca and Mg concentrations are expressed in milliequivalents per liter. Test results are summarized in Table 1.

Table 1

Soil Sample Test Results

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DIVISION OF
OIL & MINING

Terra Tek Sample	TS&R Sample	pH	mg/l			meq/l			SAR
			Na	Ca	Mg	Na	Ca	Mg	
6417	1 ft	7.78	45.2	46.0	22.2	1.97	2.30	1.83	1.37
6418	2 ft	7.93	30.3	189.0	280.0	1.32	9.43	23.0	0.33
6419	3 ft	8.19	73.0	69.0	60.0	3.18	3.44	4.94	1.45
6420	4 ft	8.28	68.0	33.0	43.5	2.96	1.65	3.58	1.83
6421	5 ft	8.41	45.7	18.0	25.4	1.99	0.90	2.09	1.15
6422	6 ft	8.43	63.0	25.0	32.0	2.74	1.25	2.63	1.97

Mr. Thomas N. Tetling
October 5, 1983
Page 2

If you have any additional questions, please give me a call.

Sincerely,



Mike Holland
Geologist

MH/alm

cc: R. Groff
TS&R Mining

S. R. McNeal
Division of Environmental Health

Richards, L.A., ed., 1954. Diagnosis and Improvement of Saline and Alkali Soils: USDA Agriculture Handbook 60, Washington, D.C., U.S. Government Printing Office.

Wayne H

October 21, 1983

Mr. Tom Tetting
4241 State Office Building
Division of Oil, Gas and Mining
Salt Lake City, Utah 84114

Dear Mr. Tetting:

Presented here are the results of measurements performed on soil samples from the Red Rock Mine in San Juna County, Utah. Measured soil properties include: permeability to waste water, mechanical compaction and electrical resistivity of the water saturated material.

Soil was supplied as a dry, partially disaggregated material. Samples from discrete areas within the proposed pond site were fully disaggregated in the laboratory and blended to provide a uniform, representative sample. Approximately 50 gms of this blended material was used to prepare the test specimen.

Permeability to liquid was measured using a steady-state, one dimensional flow technique. Previous to measuring permeability, the specimen was compacted and saturated with waste water. Compaction, saturation and permeability measurements were performed at room temperature and hydrostatic stress representative of that which is likely to exist below the pond bottom.

Permeability to waste water was calculated using Darcy's law and data obtained from laboratory measurements. Darcy's law for steady-state, one dimensional flow is:

$$K = \frac{Q}{\Delta P} \mu \frac{\ell}{A}$$

where: K = permeability (darcy)
Q = flowrate of permeating fluid (cm³/sec)
 ΔP = pressure drop across sample (bar)
 μ = viscosity of permeating fluid (cp)
 ℓ = length of sample (cm)
A = cross-sectional area of sample (cm²)

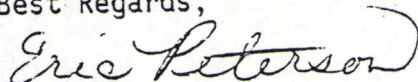
Electrical resistivity of the saturated sample was measured by applying an alternating current signal to the sample and measuring the resulting voltage drop. These data, together with Ohm's law and measured specimen geometry, were used to calculate resistivity. The average of six measurements, performed using a 1 KHz signal source, is reported in the attached summary of results.

Mr. Tom Tetting
October 21, 1983
Page 2

Mechanical compaction of the disaggregated sample was measured to assess the effect of saturation and application of hydrostatic stress. Change in sample length, occurring over the test duration, is reported in the attached summary of results.

Should you have any questions about the techniques used or results obtained, please give me a call at 584-2486.

Best Regards,



Eric Peterson
Senior Project Engineer
Production Research
TERRA TEK RESEARCH

EP/alm

Enclosure

SUMMARY OF TEST RESULTS

Client: Mr. Robin Groff, TS&R Mining, Moab, Utah

Sample Origin: Red Rock Mine, San Juan County, Utah. Waste water pond site.

Sample Type: Recombined, disaggregated soil.. Depth of burial - 18 feet

Sample Geometry: Length: 0.56 inches (initial unsaturated)
Diameter: 2.00 inches

Test Conditions: Hydrostatic Stress - 20 psi
Temperature - 72°F

Test Type	Measured Value
Permeability to Waste Water	2.40x10 ⁻⁴ darcy
Mechanical Compaction (Change in Length During Test, See Text)	7% (0.040 in/0.560 in)
Electrical Resistivity of Saturated Specimen	1.152 ohm/cm

Still Health requires < 1x10⁻⁶ cm/sec for permeability

$$1 \text{ darcy} = 9.87 \times 10^{-7} \text{ cm/sec}$$

$$= 2.06 \times 10^{-7} \text{ cm/sec}$$

$$1 \text{ darcy} = 18.2 \text{ mu}$$

$$0.00024 \times 18.2 \text{ (darcies) (mu)} = 0.004368 \text{ (mu)}$$

$$= 0.004368 \text{ (mu)} \times (0.134 \text{ ft} \div 1 \text{ mu})$$

$$= 0.0005853 \text{ ft/day}$$

$$= 5.853 \times 10^{-4} \text{ ft} \times (30.48 \text{ cm/ft})$$

$$1 \text{ day} = 8.64 \times 10^4 \text{ sec}$$

$$= 1.784 \times 10^{-2} \text{ cm/day}$$

$$= 2.06 \times 10^{-7} \text{ cm/sec}$$

O.K.